

MEMORANDUM

SUBJECT: Review of the Draft Final Remedial Investigation Report for Homestake Mining Company Superfund Site.

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I reviewed the Draft Final Remedial Investigation Report for Homestake Mining Company Superfund site with emphasis on reviewing chapter 5, Human Health Risk Assessment. The following are my comments:

1) Page 5-2 Table 5-1

HMC-10FF air monitoring station location was referred to as a background location.

EPA and NRC disagreed with this location as an air background location to the site. Please use the NRC and EPA accepted background air location of HMC-16 as the only acceptable air background for the site.

2) Page 5-4 Top paragraph

It was reported that the deed restriction will be added in the final RI report.

EPA need to review the deed restriction before it goes final.

3) Page 5-9 Conceptual Site Model for LTA

Please add to this model, the past practices of irrigating and flooding the fields at the LTA with contaminated groundwater. These practices ended up contaminating surface soil and groundwater at the LTA.

4) Page 5-14 Section 5.2.2.2.4 Air

It was reported that Homestake Facility and LTA outdoor air data were combined...

EPA is not aware of any outdoor air monitoring at the LTA. Please explain.

5) Page 5-15 Table 5-7

It was not clear why U-234 and U-238 were not included in this table.

6) Page 5-15 Soil last paragraph

It was reported that background raw data were used to estimate background threshold values (BTVs) with ProUCL.

It was not clear what value is selected as BTV (i.e. geometric mean, UCL 95%, median etc...). Background data are usually homogenous and arithmetic mean is enough to measure central tendency of the data. If the data is not homogenous, then the same statistics used for the site should be used for the background value (i.e. UCL95% for site should be compared with UCL95% background). When comparing to background data, EPA guidance also recommends comparing the two data sets using hypothesis testing to detect significant differences between background and onsite contaminant concentrations.

7) Page 5-29 Foot note to Table 5-11

Correct the foot note on CS to refer to Table 5-12

8) Page 5-52 Section 5.2.5.1.4 Comparison to Background

Soil: Need to explain background threshold value (BTV). How it was determined. What type of statistics was run through the data? Why it was considered adequate to compare to site data?

Air: A new term was used “upper simultaneous limit (USL)” defined as representative value for a maximum background concentration and used as a BTV for air concentration.

It is unacceptable to use the maximum background level to compare to 95% UCL value of site data. Need to use the 95% UCL on the arithmetic mean for background data to compare with the 95% UCL on arithmetic mean of background data.

9) Page 5-53 Table 5-19

The table heading should reflect air and not surface soil.

The number representing the maximum air value was used as BTV for air. The 95% UCL on the arithmetic mean using ProUCL for HMC-16 should be used instead for calculating the ratio of site to background level.

10) Page 5-54 Table 5-20

- The statistics used to calculate the BTV for soil was different from the statistics used to calculate the site data. The site and background data should be using the same statistics to properly compare the two data sets. EPA recommends using the 95% UCL on the arithmetic mean using ProUCL model or equivalent model to calculate the one value representing the areas of exposure.
- Under “Retain COPC or ROPC?” column a symbol of HQ was provided without explaining what it stands for in the footnotes. If it is meant for Hazard Quotient, then this cannot be used for ROPC since HQ is used for non-carcinogens and ROPC evaluated based on cancer effects. Please adjust.
- In the footnote a “+D” notation was added. Please provide which ROPC screening included their progenies.

11) Page 5-57 Table 5-21

Same first two comments as comment No. 10 for Table 5-20 above.

12) Page 5-60 Table 5-22

HMC-1OFF was referred to as background air monitor. EPA and NRC do not recognize HMC-1Off as a background air monitor. Please remove from the table.

Remove the USL value for HMC-16 air monitor as a background level and retain the HMC-16 UCL95 value as a background level for the site.

13) Page 5-61 Section 5.2.5.2 Risk Description 2nd paragraph

It was reported that “The inherent risks due to background exposure, whether Site concentrations exceed background as indicated by the ratio of the UCL95 to the BTV,...”

Similar statistics must be used for comparing site concentrations to background concentrations. Using site representative average value to compare to background representative maximum values is not adequate.

14) Page 5-61 Section 5.2.5.2.1 Future Composite Worker Homestake Facility 2nd paragraph

- It was reported that “Risks due to radon, once background is accounted for, are in the range of no excess risk to 2×10^{-2} , above the risk management range.”

Risk was calculated as a risk range due to the use of two separate radon background concentrations. Use only the 95%UCL on the arithmetic mean of 551 pCi/m³ as a background air level and report the risk without using a range.

- I got a risk of 7.7E-03 or rounding it to 8E-03 rather than the 2E-02. Please check your calculations.
- This section seems to indicate that outdoor radon was evaluated separately than indoor air for a composite worker. Composite worker scenario assumes exposures to both outdoor air and indoor air. Therefore, EPC of 1074 pCi/m³ which is calculated for both outdoor and indoor radon air concentrations should be used for this exposure scenario.

15) Page 5-61 Section 5.2.5.2.1 Future Composite Worker 3rd paragraph

It is reported that “Consultation with EPA indicated that risk cannot exceed 1, and the RadPRG calculator defaults to a different model above this point. There may be a discrepancy in risk estimates due to use of different models simply because background risks for radon, even after daughter progeny below Po-214 are removed, are so high. The EPCs for background and the outdoor air at the Site are similar, and risk estimates are also expected to be similar.”

The RadPRG calculation defaults to a different model above an excess high cancer risk of 1E-02 and not 1. A one-hit equation model is usually used instead.

EPA disagrees that the EPCs for background and the outdoor air at the Site are similar. The UCL95% on the arithmetic mean for the site over a period of at least 4 years was estimated at 949 pCi/m³ whereas the UCL95% on the arithmetic mean for the background area was estimated

at 551 pCi/m³. This increase in outdoor radon concentration is expected to have an additional excess cancer risk of 8E-03 over background levels.

16) Page 5-62 1st paragraph

Please remove the whole paragraph. It is not relevant to the baseline risk assessment.

The baseline risk assessment is an analysis of the potential adverse health effects (current or future) caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (i.e., under an assumption of no action).

17) Page 5-62 Section 5.2.5.2.2 Future Construction Worker Homestake Facility 4th paragraph

It is reported that "...and outdoor air based on all data combined from 2014 through 2018 from the HF and LTAs. The indoor air was used to represent potential trench air radon levels. The total cumulative cancer risk for air is 2×10^{-1} , which is above the upper bound of the risk management range.

- To my knowledge there was no outdoor air data from LTA. Please explain
- The total cumulative cancer risk from air was reported at 2E-01. Table 5-25 shows a risk of 8E-04. Please adjust.

It is reported that "When inherent background is subtracted out of the total risk, the cancer risk attributable to the Site ranges between no excess risk to 4×10^{-4} , which is acceptable to above the risk management range."

It was not clear where the excess cancer risk of 4E-04 was estimated. Table 5-25 provide a different excess cancer risk. Please remove a range of excess cancer risk from no risk to 4E-04. Use only one value for the background which is the 95%UCL value. Take out the statement "which is acceptable to above the risk management range". Excess cancer risk of 4E-04 is not an acceptable level. This is left later for risk management decision.

18) Page 5-62 Section 5.2.5.2.2 Future Construction Worker Homestake Facility last paragraph

It is reported that "A significant part of the cancer risk is related to Site background radon levels (refer to Table 5-25). Radon activity in outdoor air (949 pCi/m³) at the Homestake Facility is slightly higher than outdoor background concentrations of 551 pCi/m³ based on a UCL95, and similar to the BTV of 996 pCi/m³ based on the data from HMC-16. Assuming trench air radon activities are as high as Site indoor air which is 1.837 pCi/m³, estimated trench air concentrations are less than the predicted Cibola County average indoor air value from EPA (2019d) of 2000 - 4000 pCi/m³."

The excess cancer risk from outdoor background concentration of 551 pCi/m³ was not reflected in Table 5-25. Please provide the risk associated with this level of radon exposure. Remove the BTV value of 996 pCi/m³ since it was based on unsupported Value (representative of maximum value) by EPA guidance when comparing to background data.

19) Page 5-63 Section 5.2.5.2.4 Future Composite Worker Land Treatment Areas

Please refer to comments provided above (comment No. 14) on Future Composite Worker Homestake Facility.

20) Page 5-64 2nd paragraph

It is reported that “There is also a UCL95 radon concentration of 3,410 pCi/m³ from Valle Verde from EPA (EPA 2014a), but the HMC data are more recent.”

Please remove this statement from the report. Since indoor radon in the offsite residential area was not attributed to site related sources. But it was more attributed to type of house structure as to the potential source of indoor air radon gas levels.

21) Page 5-64 3rd paragraph

It is reported that “Radon concentrations in air are high enough that risk estimates may exceed 1, and when this occurs the EPA ORNL RadPRG calculator defaults to using a different model to predict risk. Therefore, differences in risk estimates between HMC16, Site outdoor air, and combined Site indoor/outdoor air may be indistinguishable. Note that radon in outdoor air (949 pCi/m³) is, however, slightly lower or similar to the BTV at HMC-16 (996 pCi/m³) (Table 5-22) and slightly higher than a UCL95 of 551 pCi/m³ for HMC-16. Excess risk attributable to the Site ranges from no excess risk to 1×10^{-2} .”

Please see comment No. 15 above.

22) Page 5-64 last paragraph

It is reported that “There is limited excess risk attributable to the Site once ambient conditions are accounted for given that subtracting inherent background risk from the Site risk produces a negative number. The LTAs therefore do not appear to have an unacceptable cancer risk for this receptor”

Two paragraphs above it was reported that “Excess risk attributable to the Site ranges from no excess risk to 1×10^{-2} . Please remove the last sentence “The LTAs therefore do not appear to have an unacceptable cancer risk for this receptor”

23) Page 5-64 Section 5.2.5.2.5 Future Construction Worker Land Treatment Areas

- It is reported that “The total cumulative cancer risk is 4×10^{-5} . This is estimated as the sum of the surface soil pathways at exposure times of 8 hours per day and soil ingestion rates of 330 mg/d plus the sum of the fugitive dust air pathways. External exposure is the only exposure pathway with elevated risks for the soil contact pathways for this receptor.”

Table 5-34 had a different cumulative cancer risk, from exposure to soil, than the 4×10^{-5} . Please adjust.

- It is reported that “The major risk driver is radon for risks estimated for the inhalation pathway from measured air concentrations; all other estimated cancer risks fall below the upper bound of the risk management range. Rn-222 risks are elevated for exposure to the Site-wide outdoor and indoor air concentration of 1,074 pCi/m³. This concentration was used to represent exposure to outdoor and trench air concentration. Once background is subtracted from the Site risk, there is little to no excess risk attributable to the Site, since risks for the Site and BTV are both 8×10^{-4} . Excess risk (Table 5-34) attributable to the LTAs is zero to 4×10^{-4} .”

The BTV value for radon background should not be used to compare with site radon data. The BTV is a representative value for the maximum value. Please use the 95%UCL on arithmetic mean value of 551 pCi/m³ to compare with the 95%UCL on arithmetic mean for site data.

Please remove the risk range attributable to the LTAs and provide only one value. The 4E-04 excess cancer value was not reported in Table 5-34. Please report the risks in the table associated with the site data and the inherent background data and the difference attributable to the site.

- It was reported that “The excess cancer risk attributable to the Site surface soils and air exposure pathways is similar to or less than that due to background. Any cancer risks are largely due to radon in air.”

This statement is not true for air exposure pathways since site air radon concentrations were almost double that of the background air radon data.

24) Page 5-81 Section 5.2.5.2.7 Potential Risk Estimates for Post-Remedy Groundwater

Evaluation of residual risk from exposure to chemicals of potential concern (COPC) and radionuclides of potential concern (ROPC) in groundwater at their proposed clean-up levels showed that the estimated excess cancer risk and non-cancer risk is much higher than the EPA’s generally accepted risk levels. Therefore, some means, to prevent groundwater use in the future, need to be put in place post groundwater remedy.